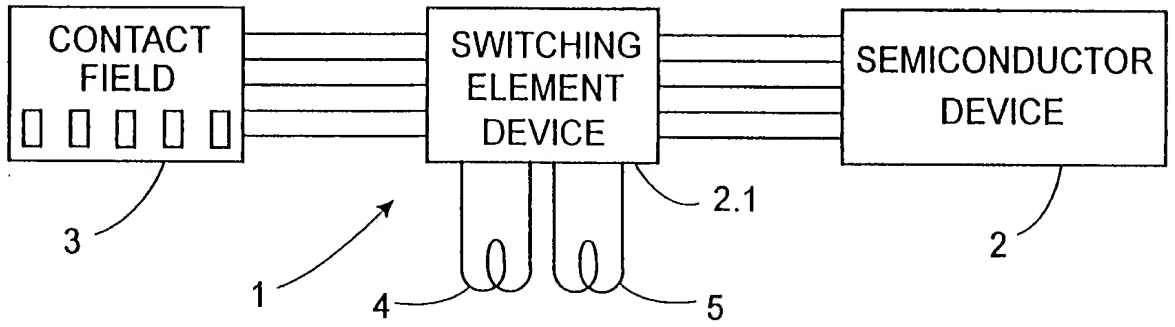

Fig. 1 (PRIOR ART)

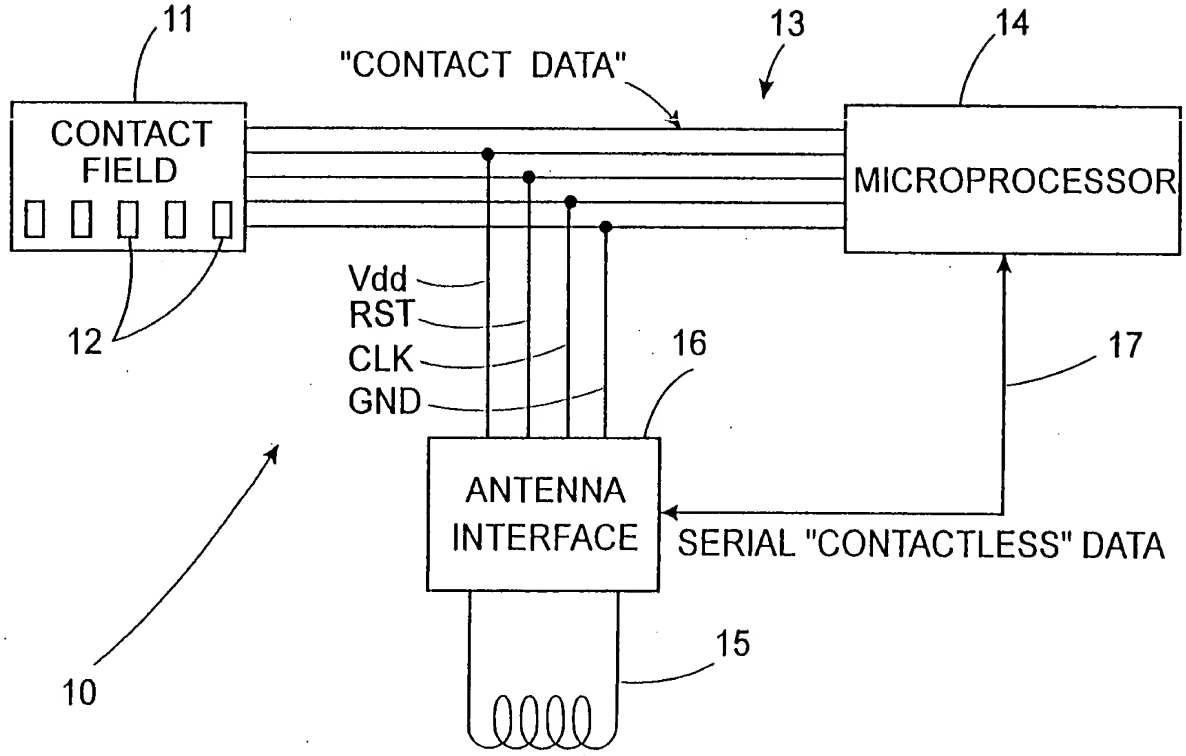

Fig. 2

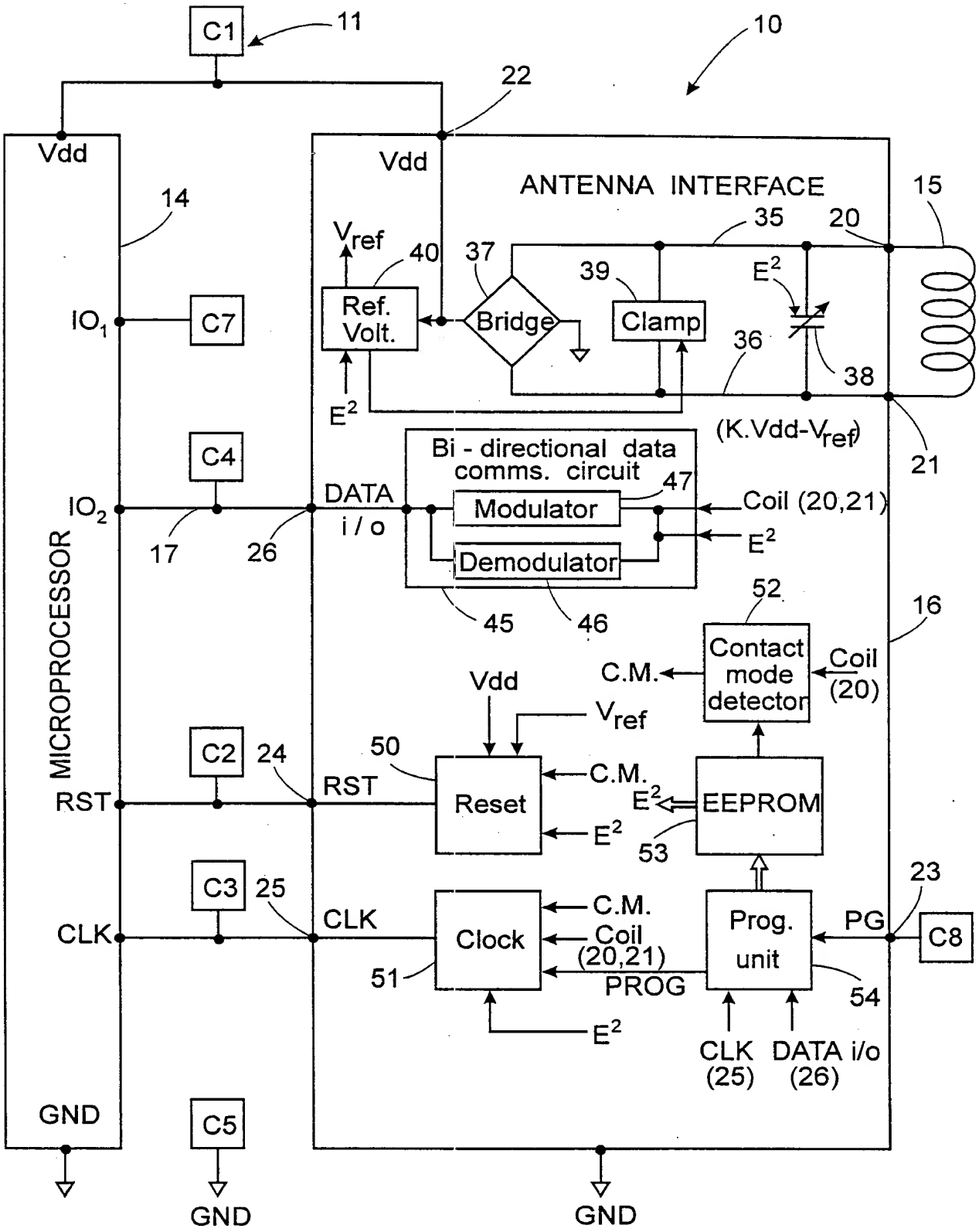
C1
11
10
22
Vdd
Vdd
ANTENNA INTERFACE
15
14
35
20
V_{ref}
40
37
39
E^2
IO_1
C7
Ref. Volt.
Bridge
Clamp
36
38
E^2
$(K.Vdd-V_{ref})$
21
C4
Bi - directional data comms. circuit
47
IO_2
DATA i / o
Modulator
Coil (20,21)
E^2
17
26
Demodulator
45
46
52
16
Contact mode detector
C.M.
Coil (20)
Vdd
V_{ref}
MICROPROCESSOR
C2
24
50
C.M.
RST
RST
Reset
E^2
EEPROM
E^2
53
C3
25
23
CLK
CLK
Clock
C.M.
Coil (20,21)
PROG
Prog. unit
PG
C8
51
54
E^2
CLK (25)
DATA i/o (26)
GND
C5
GND
GND

Fig. 3

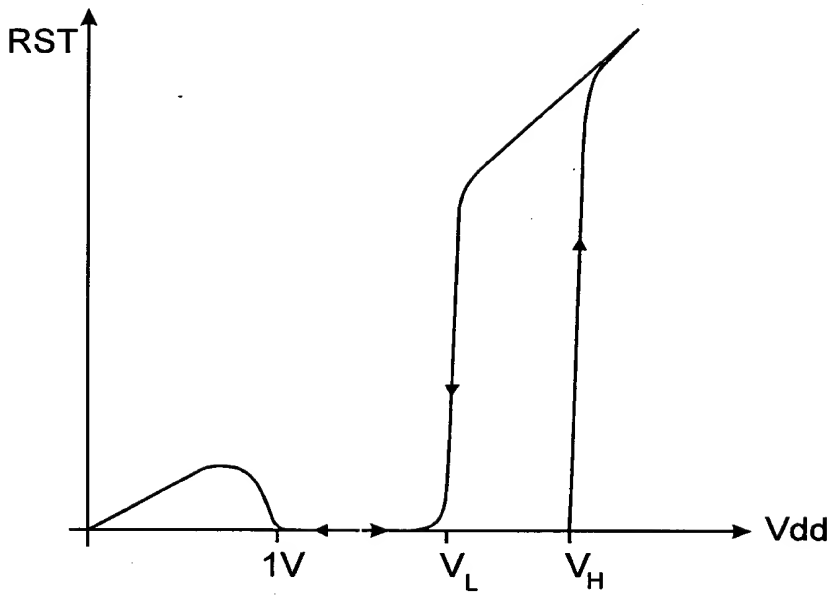

Fig. 4

MICROPROCESSOR		ANTENNA INTERFACE	
CONTACT MODE	CONTACTLESS MODE	CONTACT MODE	CONTACTLESS MODE
Vdd = ⌠ RST = ⌠ CLK = ⎍⎍⎍ IO_2 = 0 ⇒ C.M DATA via IO_1 C.M { data transaction ISO 7816	Vdd = ⟋ RST = ⌠ CLK = ⎍⎍⎍ IO_2 = 1 ⇒ C / L DATA via IO_2 C/L { data transaction CONTACTLESS PROTOCOL	Vdd = ⌠ RST, CLK = TRISTATE E / M FIELD OFF ⇒ C.M. MODE	Vdd = ⟋ RST = ⌠ CLK = ⎍⎍⎍ E / M FIELD ON ⇒ C/L. MODE DATA TRANSACTION via IO_2

Fig. 5

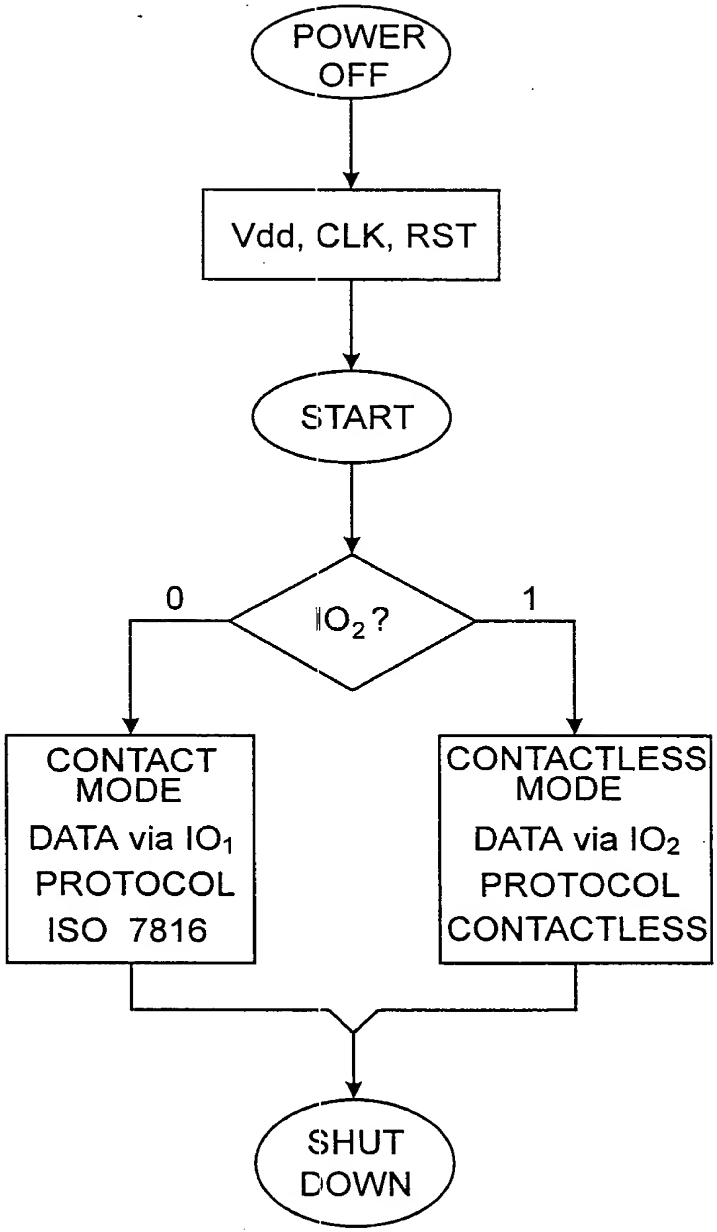

Fig. 6

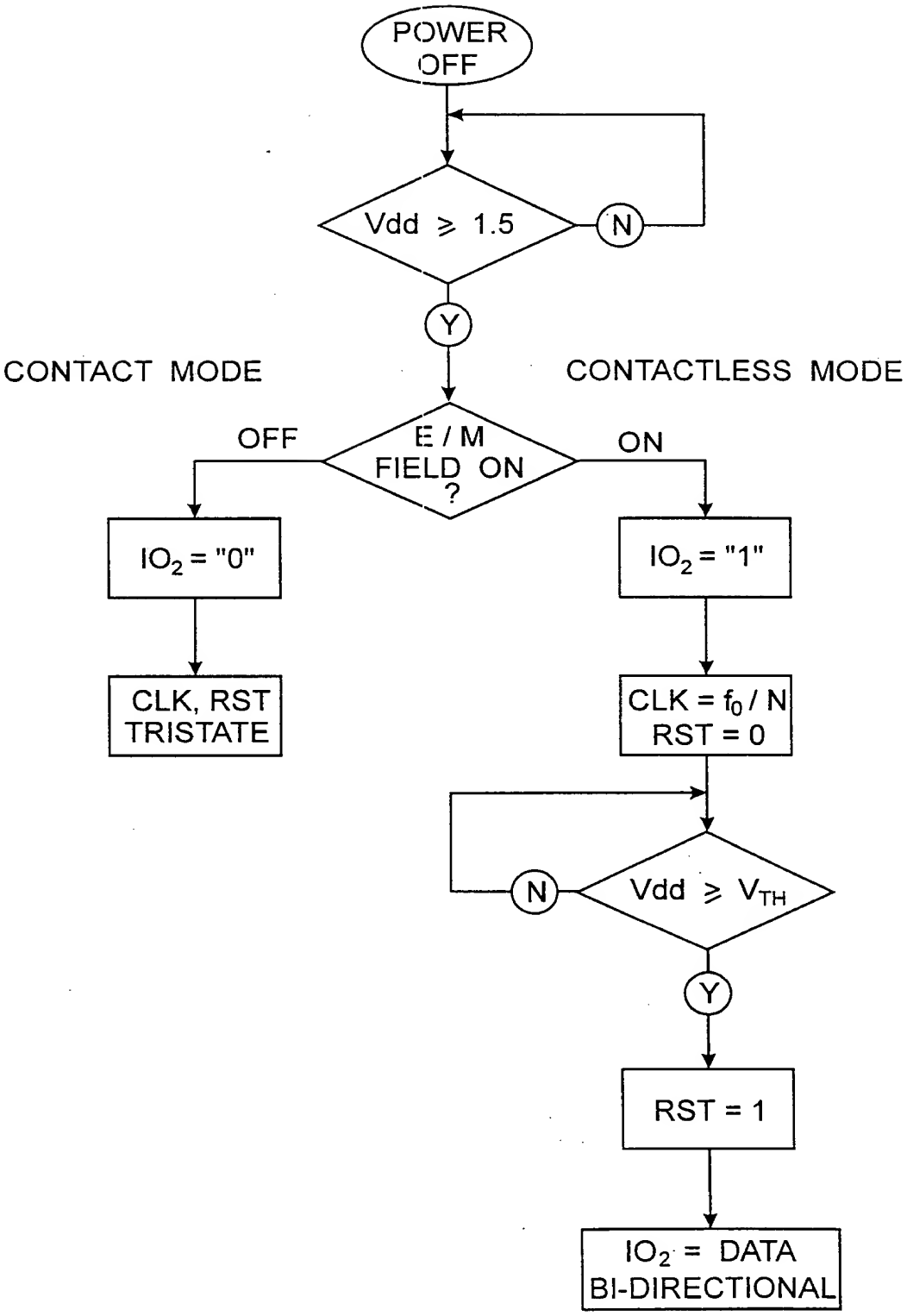

Fig. 7

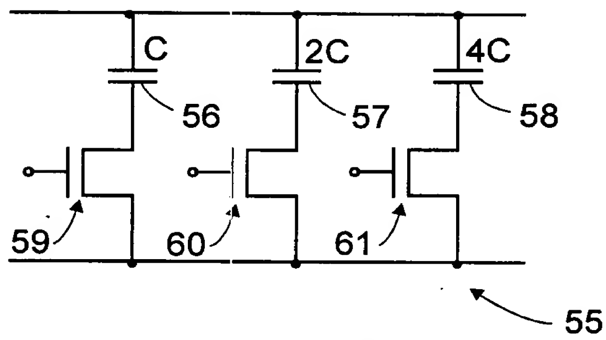
C
2C
4C
56
57
58
59
60
61
55

Fig. 8a

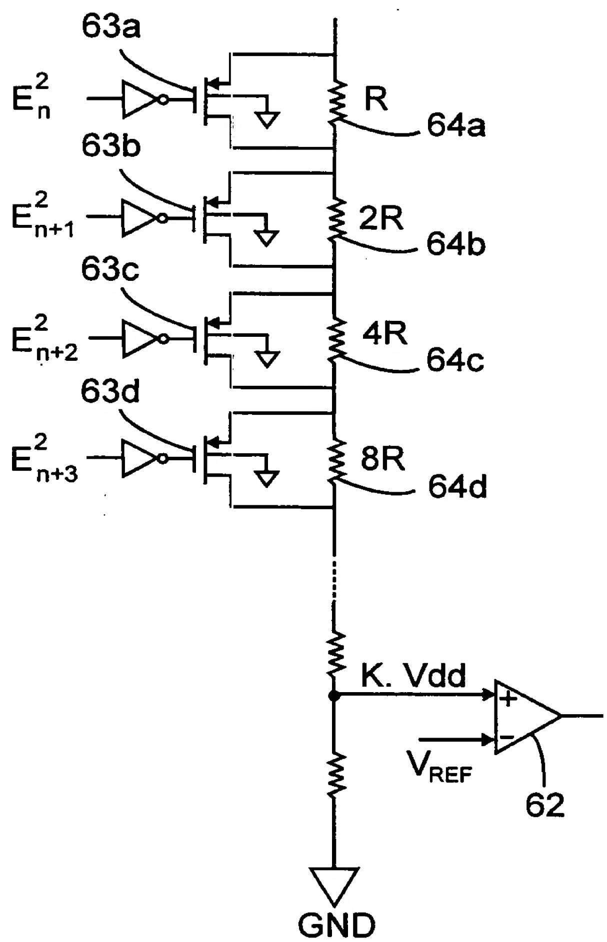
63a
63b
63c
63d
E_n^2
E_{n+1}^2
E_{n+2}^2
E_{n+3}^2
R
2R
4R
8R
64a
64b
64c
64d
K. Vdd
V_{REF}
62
GND

Fig. 8b

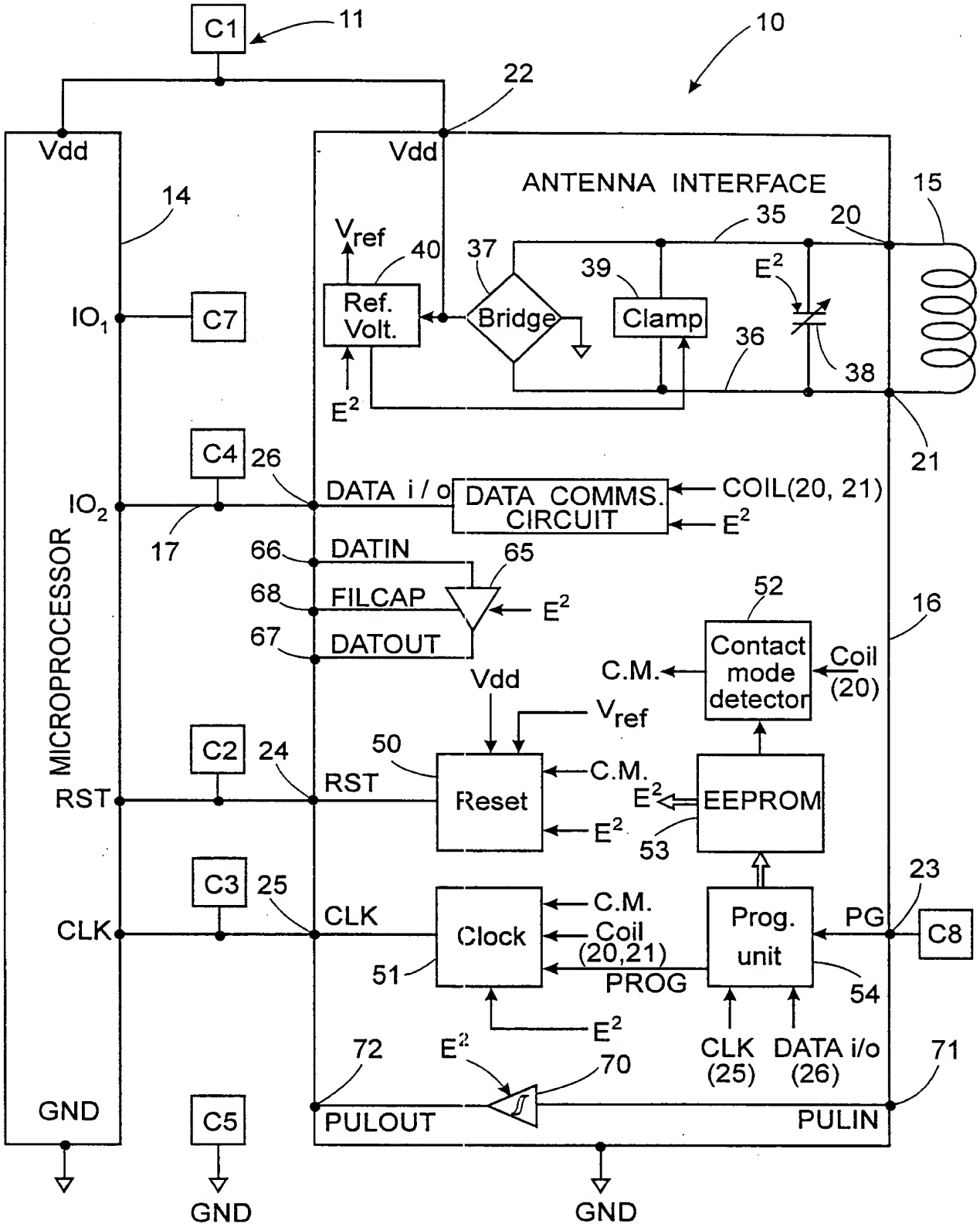
C1
11
10
22
Vdd
Vdd
ANTENNA INTERFACE
15
14
35
20
V_{ref}
40
37
39
E^2
IO_1
C7
Ref. Volt.
Bridge
Clamp
36
38
E^2
21
C4
26
IO_2
DATA i / o
DATA COMMS. CIRCUIT
COIL(20, 21)
E^2
17
66
DATIN
65
68
FILCAP
E^2
52
16
67
DATOUT
Contact mode detector
C.M.
Coil (20)
Vdd
V_{ref}
MICROPROCESSOR
C2
24
50
C.M.
RST
RST
Reset
E^2
EEPROM
E^2
53
C3
25
23
CLK
CLK
Clock
C.M.
Coil (20,21)
Prog. unit
PG
C8
51
PROG
54
E^2
72
E^2
70
CLK (25)
DATA i/o (26)
71
GND
C5
PULOUT
PULIN
GND
GND

Fig. 9

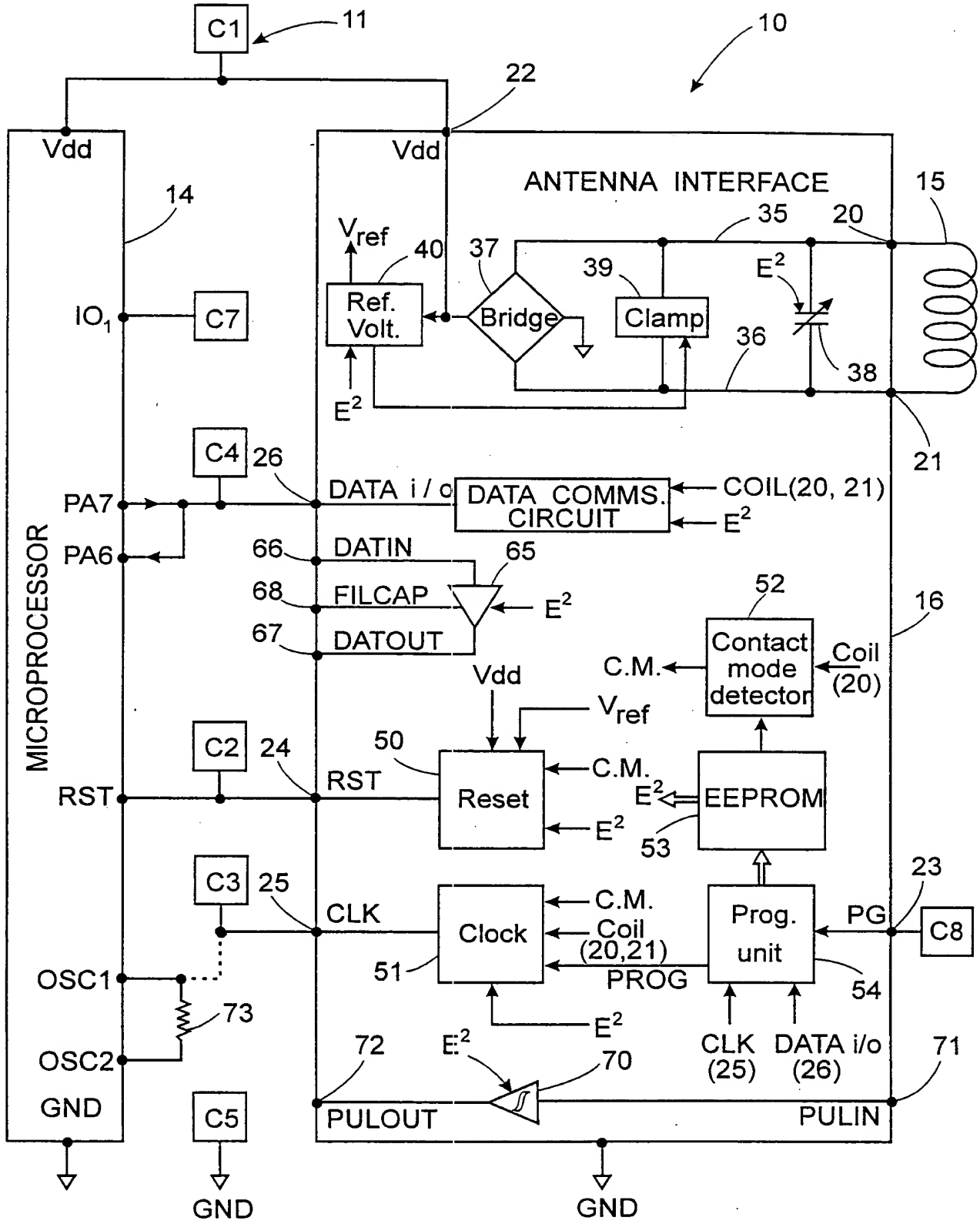
C1
11
10
22
Vdd
Vdd
ANTENNA INTERFACE
15
14
35
20
V_{ref}
40
37
39
E^2
IO_1
C7
Ref. Volt.
Bridge
Clamp
36
38
E^2
C4
26
21
PA7
DATA i / o
DATA COMMS. CIRCUIT
COIL(20, 21)
E^2
PA6
66
DATIN
65
68
FILCAP
E^2
52
16
67
DATOUT
Contact mode detector
C.M.
Coil (20)
Vdd
V_{ref}
MICROPROCESSOR
C2
24
50
C.M.
RST
RST
Reset
E^2
EEPROM
E^2
53
C3
25
23
CLK
Clock
C.M.
Coil (20,21)
Prog. unit
PG
C8
OSC1
51
PROG
54
73
E^2
OSC2
72
E^2
70
CLK (25)
DATA i/o (26)
71
GND
C5
PULOUT
PULIN
GND
GND

Fig. 10

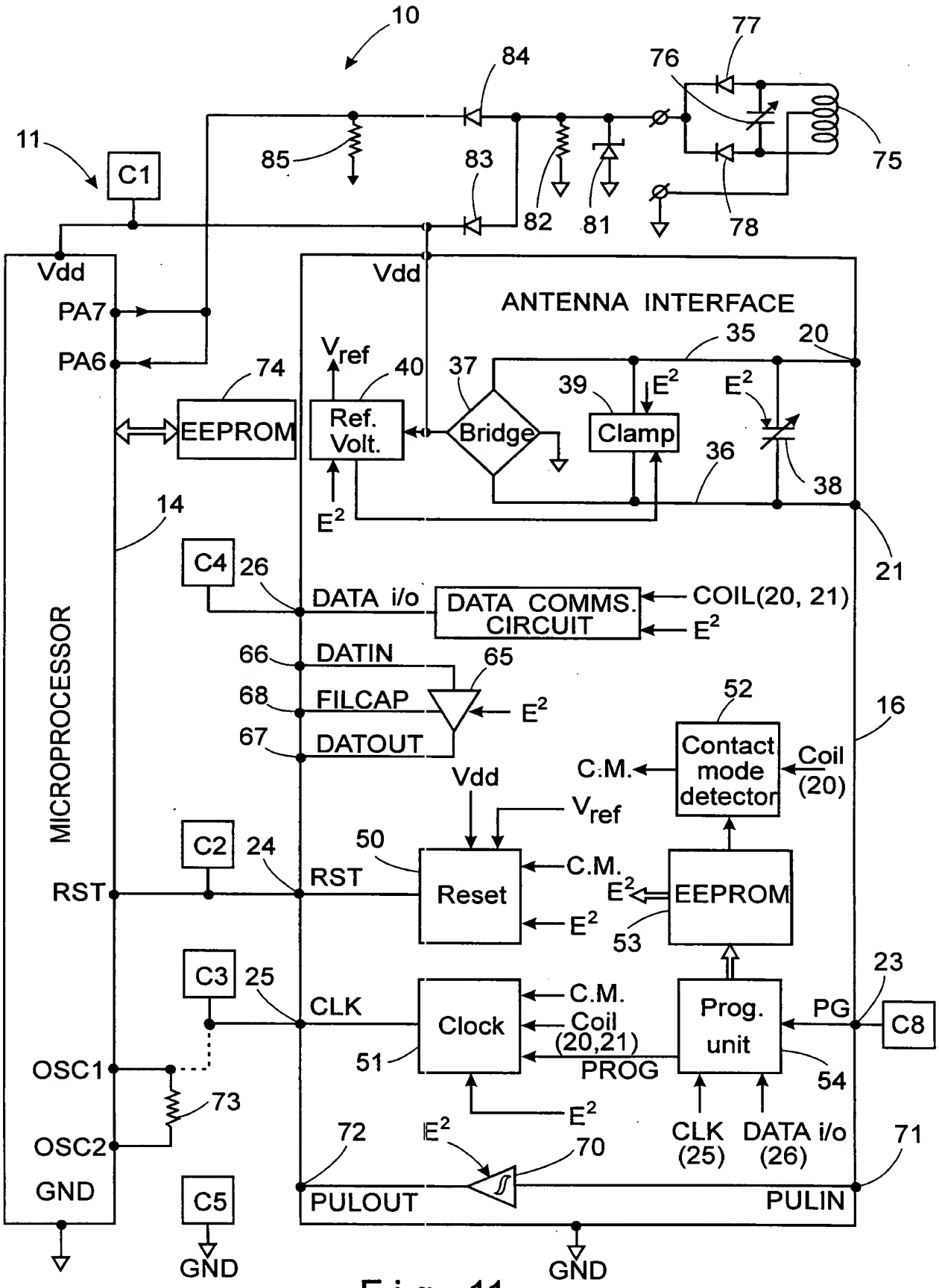
10
11
C1
84
85
83
82
81
76
77
75
78
Vdd
Vdd
ANTENNA INTERFACE
PA7
PA6
74
EEPROM
Vref
40
Ref.
Volt.
37
Bridge
39
Clamp
E2
E2
35
20
36
38
E2
14
21
MICROPROCESSOR
C4
26
DATA i/o
DATA COMMS.
CIRCUIT
COIL(20, 21)
E2
66
DATIN
65
68
FILCAP
E2
67
DATOUT
52
16
Contact
mode
detector
C.M.
Coil
(20)
Vdd
Vref
C2
24
50
RST
RST
Reset
C.M.
E2
E2
EEPROM
53
C3
25
CLK
Clock
C.M.
Coil
(20,21)
PROG
Prog.
unit
23
PG
C8
OSC1
51
54
73
OSC2
E2
72
E2
70
CLK
(25)
DATA i/o
(26)
71
GND
C5
PULOUT
PULIN
GND
GND

Fig. 11

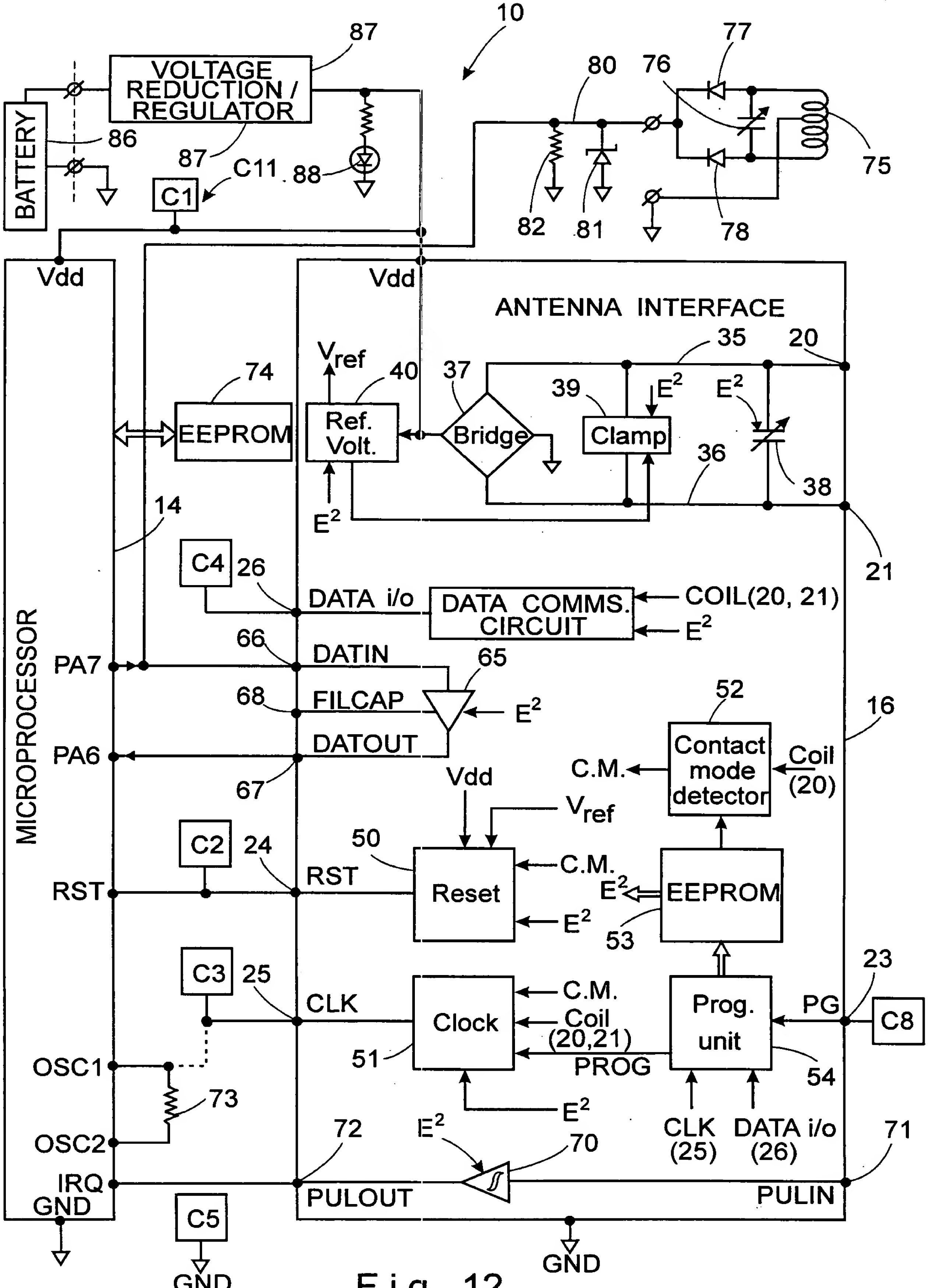
10
VOLTAGE REDUCTION / REGULATOR
87
BATTERY
86
C11
C1
88
80
76
77
75
82
81
78
Vdd
MICROPROCESSOR
ANTENNA INTERFACE
35
20
Vref
40
37
74
EEPROM
Ref. Volt.
Bridge
39
E2
Clamp
36
38
14
21
C4
26
DATA i/o
DATA COMMS. CIRCUIT
COIL(20, 21)
66
DATIN
65
PA7
68
FILCAP
DATOUT
PA6
67
52
16
Contact mode detector
C.M.
Coil (20)
50
Reset
C2
24
RST
53
C3
25
CLK
Clock
Prog. unit
PG
23
C8
Coil (20,21)
PROG
51
54
OSC1
73
OSC2
72
70
71
CLK (25)
DATA i/o (26)
IRQ
GND
PULOUT
PULIN
C5

Fig. 12